Cambridge Assessment International Education

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MATHEMATICS **0580/42**

Paper 4 (Extended) **May/June 2022**

2 hours 30 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS
- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use either your calculator value or 3.142.

INFORMATION
- The total mark for this paper is 130.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

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1 **(a)** Find the lowest common multiple (LCM) of 30 and 75.

View solution

..... [2]

(b) Share \$608 in the ratio 4 : 5 : 7.

View solution

\$ .....

\$ .....

\$ ..... [3]

(c) Work out $\frac{6.39 \times 10^4}{2.45 \times 10^6}$.

Give your answer in standard form.

View solution

..... [2]

(d) Write $0.\dot{2}\dot{7}$ as a fraction.

View solution

..... [1]

(e) A stone has volume $45\,cm^3$ and mass 126 g.
Find the density of the stone, giving the units of your answer.

[Density = mass ÷ volume]

View solution

.... [2]

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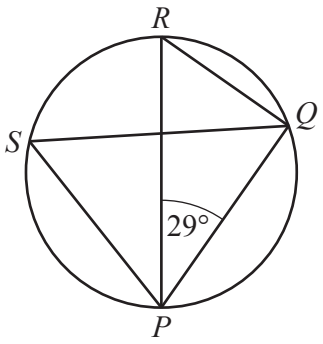
2 **(a)**



NOT TO SCALE

The points P, Q, R and S lie on a circle with diameter PR.

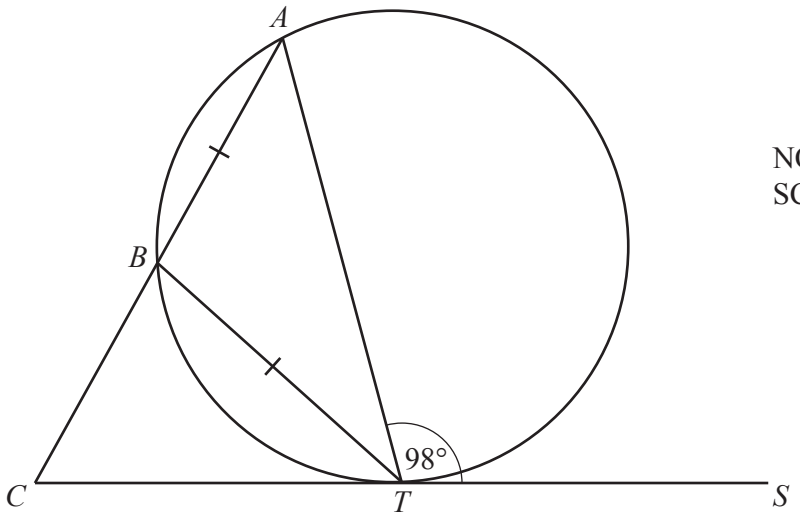
Work out the size of angle PSQ, giving a geometrical reason for each step of your working.

.....

.....

..... [3]

(b)



NOT TO SCALE

The points A, B and T lie on a circle and CTS is a tangent to the circle at T.
ABC is a straight line and $AB = BT$.
Angle $ATS = 98°$.

Work out the size of angle ACT.

Angle $ACT =$ ..... [4]

3 A line, l, joins point F (3, 2) and point G ($-$ 5, 4).

(a) Calculate the length of line l.

View solution

..... [3]

(b) Find the equation of the perpendicular bisector of line l in the form $y = mx + c$.

View solution

$y =$ ..... [5]

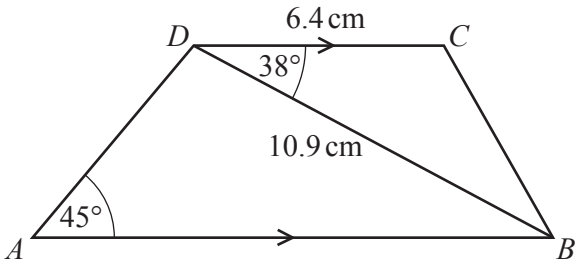
(c) A point H lies on the y-axis such that the distance $GH = 13$ units.

Find the coordinates of the two possible positions of H.

View solution

(....., ...) and (....., ...) [4]

4



NOT TO SCALE

ABCD is a trapezium with *DC* parallel to *AB*.
DC = 6.4 cm, *DB* = 10.9 cm, angle *CDB* = 38° and angle *DAB* = 45°.

(a) Find *CB*.

View solution

CB = ... cm [3]

(b) (i) Find angle *ADB*.

View solution

Angle *ADB* = ... [1]

(ii) Find *AB*.

View solution

AB = ... cm [3]

(c) Calculate the area of the trapezium.

View solution

..... cm^2 [3]

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5 **(a)** Draw the lines of symmetry of the rectangle.

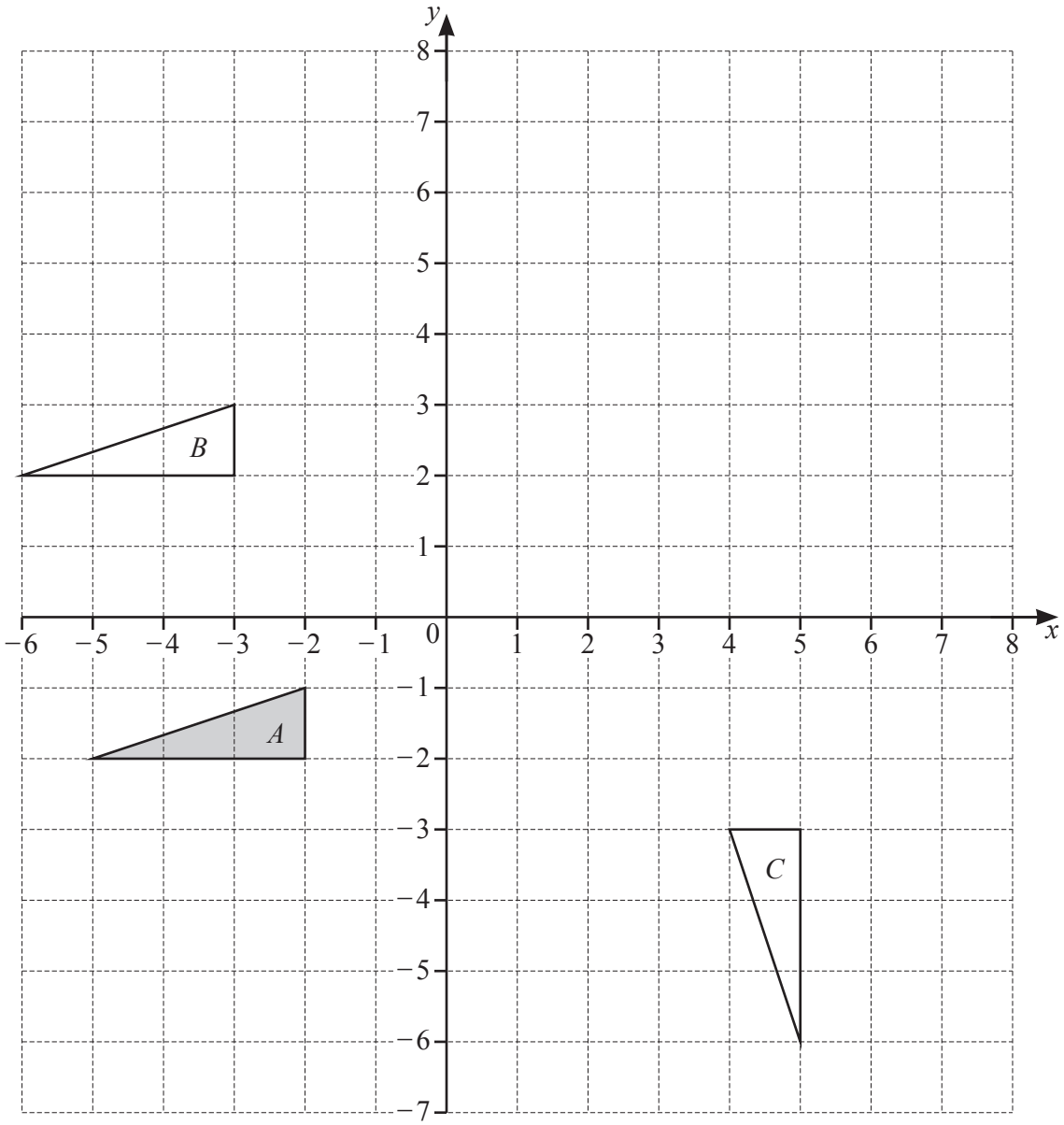
View solution



[2]

View solution

(b)



(i) Describe fully the **single** transformation that maps

(a) triangle A onto triangle B,

.....

..... [2]

(b) triangle A onto triangle C.

.....

..... [3]

(ii) **(a)** Draw the image of triangle A after reflection in $y = 2$. [2]

(b) Draw the image of triangle A after enlargement by scale factor -2, centre $(-1, 1)$. [2]

View solution

6 **(a)** At a festival, 380 people out of 500 people questioned say that they are camping.
There are 55 300 people at the festival.

View solution

Calculate an estimate of the total number of people camping at the festival.

..... [2]

(b) 12 friends travel to the festival.
5 travel by car, 4 travel by bus and 3 travel by train.
Two people are chosen at random from the 12 friends.

View solution

Calculate the probability that they travel by different types of transport.

..... [4]

(c) Arno buys a student ticket for $43.68 .
This is a saving of 16% on the full price of a ticket.

View solution

Calculate the full price of a ticket.

$ ..... [2]

(d) At a football match, there are 29 800 people, correct to the nearest 100.

(i) At the end of the football match, the people leave at a rate of 400 people per minute, correct to the nearest 50 people.

Calculate the lower bound for the number of minutes it takes for all the people to leave.

View solution

..... min [3]

(ii) At a cricket match there are 27 500 people, correct to the nearest 100.
Calculate the upper bound for the difference between the number of people at the football match and at the cricket match.

View solution

..... [2]

7 Information about the mass, m kg, of each of 150 children is recorded in the frequency table.

Mass (m kg)	$0 < m \leqslant 10$	$10 < m \leqslant 20$	$20 < m \leqslant 25$	$25 < m \leqslant 40$	$40 < m \leqslant 50$
Frequency	12	38	32	50	18

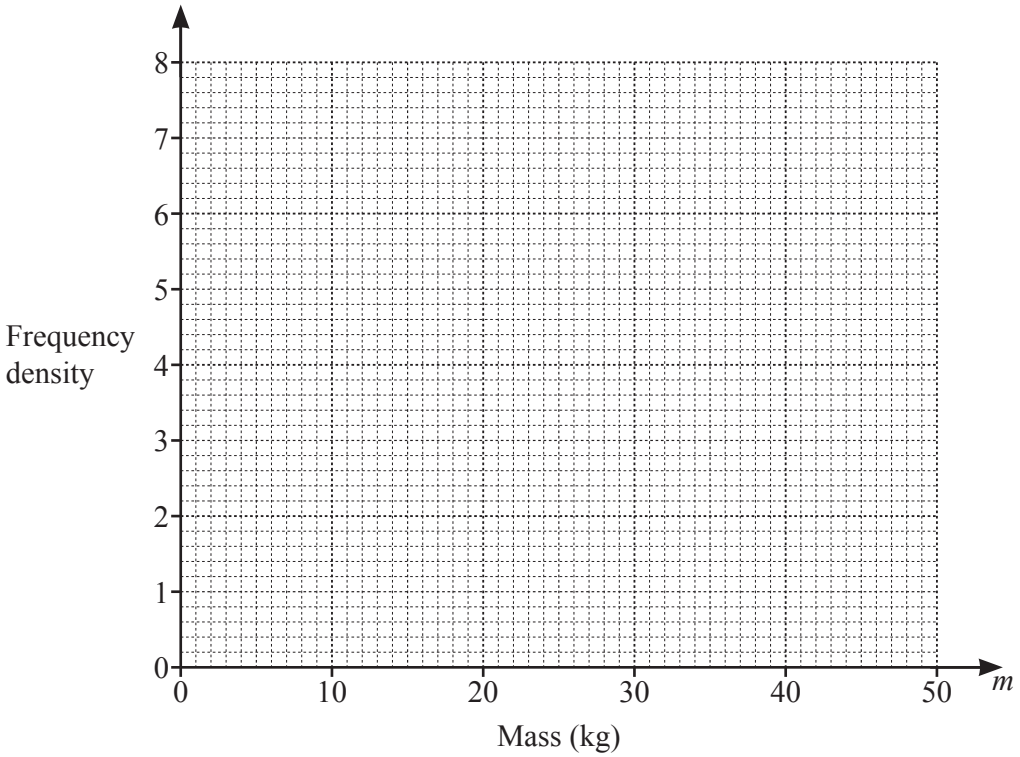
(a) Calculate an estimate of the mean mass.

View solution

..... kg [4]

(b) Draw a histogram to show the information in the table.

View solution



[4]

(c) **(i)** Use the frequency table to complete this cumulative frequency table.

View solution

Mass (m kg)	$m \leqslant 10$	$m \leqslant 20$	$m \leqslant 25$	$m \leqslant 40$	$m \leqslant 50$
Cumulative frequency					

[2]

(ii) Calculate the percentage of children with a mass greater than 10 kg.

View solution

..... % [2]

8 **(a)** Solve.

$$10 - 3p = 3 + 11p$$

View solution

$p =$ ..... [2]

(b) Make m the subject of the formula.

$$mc^2 - 2k = mg$$

View solution

$m =$ ..... [3]

(c) Solve.

$$\frac{1}{x-3} + \frac{4}{2x+3} = 1$$

View solution

$x =$ ..... or $x =$ ..... [5]

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(d) Solve the simultaneous equations.
You must show all your working.

View solution

$$x + 2y = 12$$
$$5x + y^2 = 39$$

$x =$ …….. $y =$ ……

$x =$ …….. $y =$ …… [5]

(e) Expand and simplify.

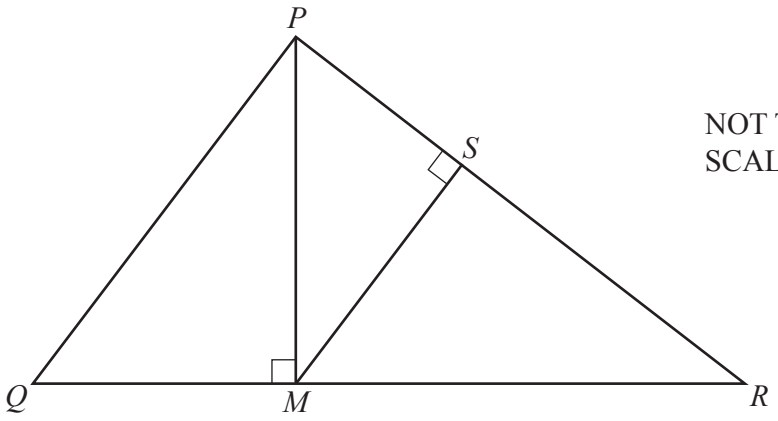
View solution

$$(2x - 3)(x + 6)(x - 4)$$

..... [3]

9 (a)

View solution



In triangle PQR, M lies on QR and S lies on PR.

Explain, giving reasons, why triangle PMR is similar to triangle MSR.

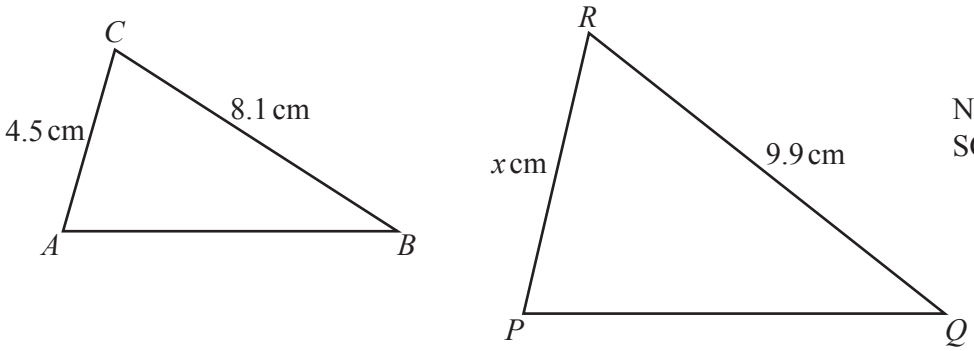
.....

.....

..... [3]

(b)

View solution



Triangle ABC is similar to triangle PQR.

(i) Find the value of x.

$x =$ ..... [2]

(ii) The area of triangle PQR is $25\,\text{cm}^2$.

View solution

Calculate the area of triangle ABC.

..... cm^2 [2]

10 **(a)** Find all the positive integers which satisfy the inequality.

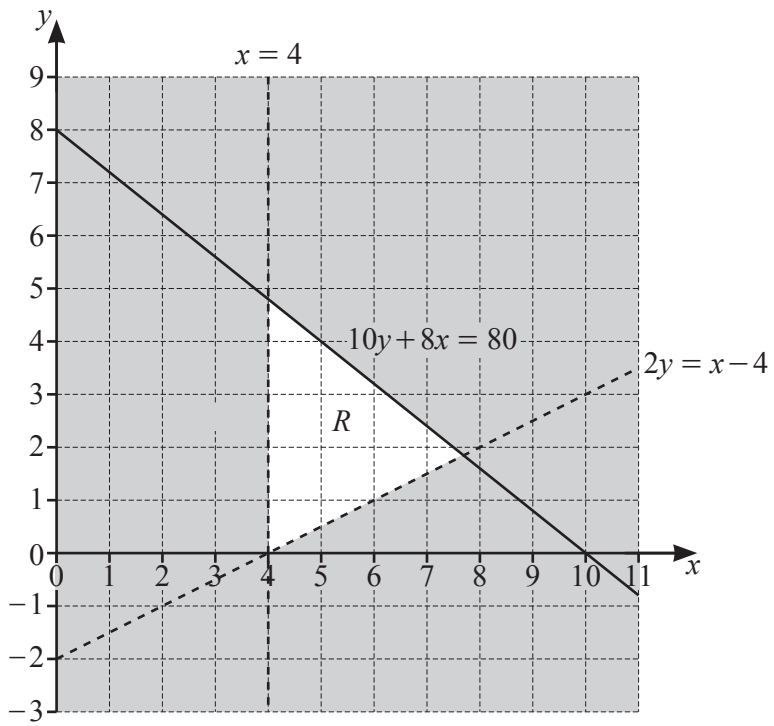
View solution

$$3n - 8 > 5n - 15$$

..... [2]

(b)

View solution



The region marked R is defined by three inequalities.

(i) Find these three inequalities.

.....

.....

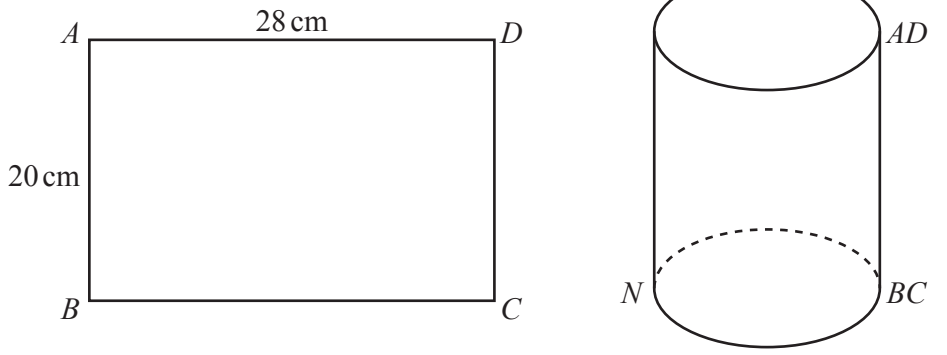
..... [3]

(ii) Write down the largest value of $3x + y$ in the region R for integers x and y.

View solution

..... [2]

11 (a)



NOT TO SCALE

A rectangular sheet of paper $ABCD$ is made into an open cylinder with the edge AB meeting the edge DC.
$AD = 28$ cm and $AB = 20$ cm.

(i) Show that the radius of the cylinder is 4.46 cm, correct to 3 significant figures.

[2]

(ii) Calculate the volume of the cylinder.

..... cm^3 [2]

(iii) N is a point on the base of the cylinder, such that BN is a diameter.

Calculate the angle between AN and the base of the cylinder.

..... [3]

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(b) The volume of a solid cone is $310\,\text{cm}^3$.
The height of the cone is twice the radius of its base.

View solution

Calculate the slant height of the cone.

[The volume, V, of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

..... cm [5]

12 A curve has equation $y = x^3 - kx^2 + 1$.
When $x = 2$, the gradient of the curve is 6.

(a) Show that $k = 1.5$.

View solution

[5]

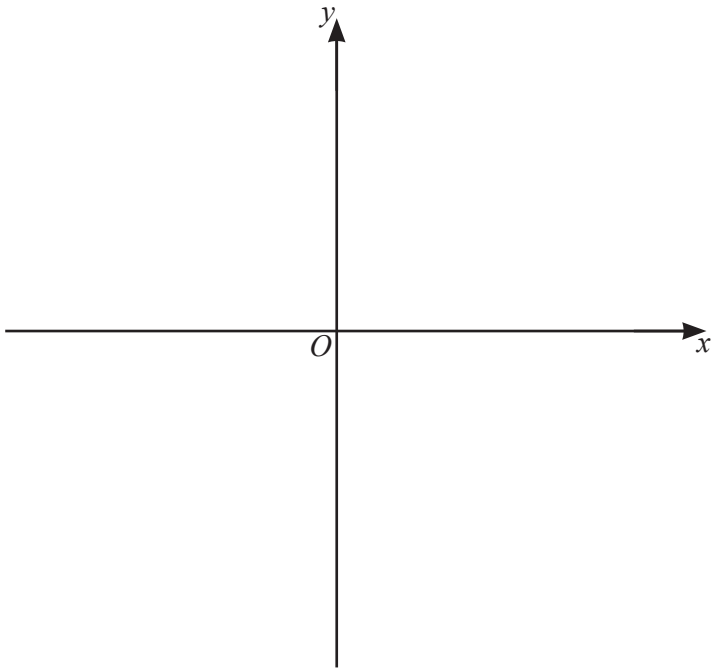
(b) Find the coordinates of the two stationary points of $y = x^3 - 1.5x^2 + 1$.
You must show all your working.

View solution

(....., ...) and (....., ...) [4]

(c) Sketch the curve $y = x^3 - 1.5x^2 + 1$.

View solution



[2]

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